



OXBOW FISH HATCHERY

**2000 Steelhead Brood Year Report
1999 Spring Chinook Brood Year Report**

**Kent Hills
Fish Hatchery Assistant Manager**

**April 2002
IDFG 02-08**

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	1
ACKNOWLEDGEMENTS.....	3
HATCHERY OVERVIEW.....	4
Introduction	4
Location.....	4
Objectives	4
Facility Description	4
Water Supply.....	5
Adult Operation Water Source	5
Incubation Water Source	5
Staffing	6
Hatchery Improvements	6
Accomplished	6
Recommended	6
STEELHEAD PRODUCTION	7
Adult Collection	7
Steelhead Returns to Hells Canyon Trap	7
Length Frequencies and Age and Sex Ratios	7
Out-planting	8
Incidental Capture	8
Marks, Fin Clips, Injuries	8
Holding and Spawning	8
Pre-spawning Mortality	8
Spawning Operations	8
Disease Testing.....	9
Incubation.....	9
Egg Development	9
Fry Development	9
Egg and Fry Disposition	10
Egg Shipments	10
Fry Shipments	10
Carcass Disposition	10
Smolt Releases	10
SALMON PRODUCTION	11
Adult Collection	11
Salmon Returns to Hells Canyon Trap	11
Length Frequencies and Age and Sex Ratios	11
Holding and Spawning	11
Transport	11
Holding	12
Adult Treatments	12
Pre-spawning Mortality	12
Spawning Operations	12

TABLE OF CONTENTS Continued

Page

FIGURES

Figure 1. Steelhead Run Timing	14
Figure 2. Steelhead Length Frequencies.....	14
Figure 3. Spring Chinook Run Timing.....	15
Figure 4. Spring Chinook Length Frequencies	15

APPENDICES

Appendix 1. Steelhead Run Timing	17
Appendix 2. Steelhead Length Frequencies.....	18
Appendix 3. Steelhead Age and Sex Ratios	19
Appendix 4. Steelhead Disposition	19
Appendix 5. Steelhead Male to Female Disposition	19
Appendix 6. Steelhead Spawning Summary.....	20
Appendix 7. Steelhead Disposition of Eggs and Fry.....	21
Appendix 8. Spring Chinook Run Timing	22
Appendix 9. Spring Chinook Length Frequencies.....	23
Appendix 10. Spring Chinook Age Class Breakdown	24
Appendix 11. Spring Chinook Disposition.....	24
Appendix 12. Oxbow Hatchery Fish Trapping Summary and Breakdown	25
Appendix 13. Snake River Historic Releases and Return Data	26

ABSTRACT

Fall trapping consisted of 17 trapping days between October 26, 1999 and December 8, 1999. Two-thousand-twenty (90%) steelhead were trapped during this period. The trap was put back into operation on March 21, 2000 and was shut down on April 4, 2000, having operated 7 days during this period and trapped an additional 230 (10%) steelhead, bringing the total to 2,250 for the season. These fish included 2,126 (94%) hatchery steelhead and 124 (6%) wild steelhead. The wild fish were released below Hells Canyon Dam.

The age and sex ratios are as follows: one-ocean fish totaled 1,930 (86%) and consisted of 995 males (44%) and 935 females (42%). The 995 males include 959 (96%) hatchery and 36 (4%) wild. The 935 females included 867 (93%) hatchery and 68 (7%) wild. Two-ocean fish totaled 320 (14%) and consisted of 68 males (3%) and 252 females (11%). The 68 males include 64 (94%) hatchery and 4 (6%) wild fish and the 252 females include 236 (94%) hatchery and 16 (6%) wild fish. Trapping was discontinued because of the quantity of fish on station and so that Idaho Power could begin replacing the underground pipelines. There were 137 steelhead trapped that were tagged (marked) in the following manner: 132 coded wire tags (CWT) and 5 floy tags.

During the fall of 1999 and the spring of 2000, 1,169 adult steelhead were considered surplus and were out-planted into surrounding waters for additional sport fisheries and supplemental propagation. During the fall, 300 fish were released into the Boise River, 300 into Hells Canyon Reservoir and 300 released into the Little Salmon River. In the spring, 204 were released into Hells Canyon Reservoir and 65 were released into Hazard Creek on the Little Salmon River.

Pre-spawning mortality totaled 95 adult steelhead (74 males and 21 females).

Spawning consisted of 12 egg takes from March 16, 2000 until April 24, 2000. A total of 374 females were spawned; however, the eggs from all 65 females of the first spawn and from 6 females of the second spawn were culled to make room for eggs from later run fish. The discarded eggs were not enumerated and are not included in figures in this report. The remaining 303 females spawned had an average fecundity of 5,028, totaling 1,523,428 green eggs; 1,319,069 reached the eye-up stage, constituting 87% of the green eggs. We shipped 528,253 eyed-eggs to Niagara Springs Fish Hatchery (NSFH). The remaining eggs were held at OFH, reared to fry stage and then 518,184 fry were shipped to NSFH. The remaining 248,908 surplus fry were disposed of.

One-hundred-fifty females (40%) were tested for virus, 20 (5%) were tested for whirling disease (WHD), and 71 (19%) were tested for bacterial kidney disease (BKD) by enzyme-linked immunosorbent assay (ELISA) by employees at the Eagle Fish Health Laboratory (EFHL). All females tested were negative for pathogens. These percentages are of total spawned females and include tests conducted on the steelhead that were spawned but whose eggs were not used.

In addition to incubating eggs and fry from steelhead spawned at OFH, 2,035,721 green eggs were shipped to OFH from Pahsimeroi Fish Hatchery (PFH). These eggs were flown to the hatchery over six trips and went through the same process, as did the OFH eggs, with the exception of the last three shipments. Only sufficient numbers of the last three shipments were enumerated to provide the number of eggs and/or fry required from these shipments. We shipped 676,047 button up fry were shipped to NSFH. Based on the eggs counted and picked, the percent of eye-up was 89.7%. Since this run report pertains to steelhead spawned at OFH, there is no other mention of Pahsimeroi eggs in this report. Additional information can be found in the *Pahsimeroi Steelhead Run Report*.

The OFH trap was operated for 26 days between May 5, 2000 and July 15, 2000. Seventy-nine spring Chinook *Oncorhynchus tshawytscha* were interrogated. Seventy hatchery chinook salmon were trapped consisting of 66 jacks and 4 adults. A total of nine wild Chinook salmon consisting of six jacks and three adults were interrogated. All wild/natural salmon were caudal fin punched and released below Hells Canyon Dam. None of the previously trapped wild/natural salmon returned to the trap. There were two jack mortalities and two other jacks escaped into Hells Canyon Reservoir. There were no adult mortalities. Because of the small return, the Nez Perce Tribe was given the jacks. Tribal representatives made two trips to OFH and received a total of 44 jacks. The remaining jacks and adults were transported to Rapid River Fish Hatchery (RRFH) using a portable pickup tank.

The mission of Oxbow Fish Hatchery is to trap chinook salmon and hold them until they are shipped to RRFH for holding and spawning. When the chinook arrive at OFH, the hatchery salmon are measured, recorded, injected with antibiotics and placed in the holding pond. The wild/natural salmon are treated in the same manner, except they are not injected and are released back into the Snake River below Hells Canyon Dam. Jack salmon are not injected and are placed in a separate holding pond. Some of the jacks are transported to RRFH and others are given to the Nez Perce Tribe for personal and ceremonial use. The adult salmon are transported to RRFH weekly when the holding pond water is cold, and as often as daily when the holding pond water reaches temperatures in the 60°F plus range. Since the salmon are spawned at RRFH, there is little information included in this report. Refer to the *Rapid River Fish Hatchery Brood Year Report* for additional information.

ACKNOWLEDGEMENTS

The staff at Oxbow Fish Hatchery would like to thank the Idaho Power employees and the Idaho Fish and Game Department employees who have contributed to the successful operation of the hatchery.

HATCHERY OVERVIEW

INTRODUCTION

Oxbow Fish Hatchery (OFH) is part of the Idaho Power Company's (IPC) hatchery system and has been in operation since 1962. The OFH facility is owned and funded by IPC and operated by the Idaho Department of Fish and Game (Department). The hatchery was constructed to mitigate for losses of anadromous fish resulting from the construction of Hells Canyon Dam on the Snake River. The OFH is a steelhead trout *Oncorhynchus mykiss* adult holding, spawning and egg rearing station. Spring chinook salmon *O. tshawytscha* are collected and held for transport to Rapid River Fish Hatchery (RRFH).

LOCATION

The hatchery is located in Eastern Oregon adjacent to the confluence of Pine Creek and the Snake River (Oregon and Idaho border) at the Idaho Power village known as Oxbow, Oregon, located at the eastern most end of Oregon State Highway 86. It is approximately 67 highway miles east of Baker City, Oregon and approximately 150 highway miles northwest of Boise, Idaho

OBJECTIVES

The primary objective of OFH is to trap and spawn enough returning adult steelhead and to trap sufficient numbers of spring chinook salmon, which are then transported to RRFH for spawning, in order to meet the Hells Canyon mitigation requirements for adult anadromous fish returns on the upper Snake River. The mitigation objective for steelhead is to produce 1.3 million eyed-eggs and ultimately produce 400,000 lbs of steelhead trout smolts annually. The mitigation objective for spring chinook is to produce 1,000,000 smolts annually.

FACILITY DESCRIPTION

The OFH consists a hatchery building which houses the office, shop, over-night sleeping quarters, and incubation room; four adult holding ponds including fish loading and off-loading facilities; an incubation water chilling unit; a spawning building; bio-aide dorm; assistant hatchery managers' residence; and an off-site fish trap. In addition, the facility has six cinder block raceways that are in need of renovation.

The hatchery building is a 28-ft x 60-ft single-story metal structure partitioned into two main rooms. Half of the building is used as shop space, office space, and sleeping quarters, while the other half is for egg incubation. The incubation room has 384 incubation trays (Heath trays) in 24 stacks, giving it the capacity to incubate 3.4 million eggs. Two 8-ft square sheds attached to the main building provide storage space.

Adult holding and production facilities include four holding ponds, a fish trap, and a fish transport truck. The four holding ponds are actually two large ponds separated into four. The two larger divisions each measure 105-ft x 30-ft x 5-ft, providing 31,500 cubic feet (cuft) of holding area. The two smaller divisions measure 55-ft x 30-ft x 5-ft, providing 16,500 cuft of holding space. Two electric crowding racks provide the ability to consolidate the fish for handling. Six outside raceways 3-ft x 6-ft x 100-ft could provide 10,800 cuft of rearing space, if renovated. The adult fish trap consists of an attraction channel, the fish trap, and a loading hopper. The fish are removed from the trap after the loading hopper is hoisted 80 feet up to the fish transport truck.

The well water chiller refrigeration unit is enclosed in a 12-ft x 17-ft metal building at the west side of the hatchery building. The chiller has the capacity to chill 120 gallons of water per minute (gpm) to 40°F.

The spawning building is approximately 13-ft x 18-ft and is located adjacent to two of the holding ponds. It consists of a small building, part of which is recessed into the ground to provide holding areas for the fish that are to be spawned. The remaining portion is at ground level where the females are spawned and the eggs processed. The walls are made of fiberglass panel doors which can be opened so that most of the inside area is exposed to the outside.

WATER SUPPLY

Adult Operation Water Source

Water for adult hatchery operations is pumped from the Snake River. A pumping platform adjacent to the hatchery holds two 100-hp production pumps, each supplying 17 cubic feet of water per second (cfs). One pump is powered from the Pine Creek substation, and the second is powered from the Oxbow power plant substation. Only one pump operates at a time. The other pump acts as an emergency backup. Water from the production pumps passes over two aeration pump platforms before entering the four adult holding ponds. Water temperatures range from a winter low of 34°F to a late summer high of 72°F.

Incubation Water Source

Two wells provide the water for egg incubation. One well serves as a primary water source, while the other is an emergency backup with a separate power source. The primary well water is a constant 52°F, while the backup is a constant 54°F. Each well is equipped with a 3-hp pump, making each capable of producing approximately 125 gpm. After passing through the chiller, incubation water enters an elevated surge tank in the hatchery building and is distributed through two 4-inch PVC water lines to the 24 incubator stacks. By using the chillers, well water is chilled to approximately 43°F before it enters the hatchery building.

STAFFING

One permanent Fish Hatchery Assistant Manager staffs OFH. Two four-month temporary bio-aides and one eight-month temporary bio-aide share the 2,400 hours budgeted for hatchery maintenance and operation.

HATCHERY IMPROVEMENTS

Accomplished

During the period for which this report is written, Idaho Power's Oxbow maintenance personnel completed the following projects at the hatchery.

- 1) Replacement of most of the underground pipelines that feed the hatchery was accomplished in the summer and fall of 2000.

Recommended

The following projects have been identified by hatchery staff and should be completed in the future.

- 1) The spawning building needs to be enlarged and lowered four feet into the ground to reduce potential employee injuries and falls from climbing ladders. An enlarged space would also make the collection of samples more efficient. Lowering the spawning portion of the building would enable unripe fish to be returned into the holding ponds without dropping them over the fence which would decrease fish stress.
- 2) Additional hatchery office space is needed. Presently, the south half of the hatchery building serves as office space, a workshop, freezer space, and a small conference area. The assistant hatchery managers' office space is a small cubicle that is partitioned from the rest of the work area. It has a doorway (no door) and a window (no glass) opening into the work area. This allows air circulation. The cubicle is insufficient in size to accommodate current needs. The following are examples of why the office should be expanded. There is insufficient filing space and the bio-aide's desk is in the open work/conference area. The office dorm needs renovation as well. Current facilities are not appropriate for overnight occupancy. With the installation of a shower facility and a 220-volt receptacle for a range, the dorm would be suitable for overnight use. The 220-volt receptacle could also be used to power a welder, which could be used to help accomplish hatchery maintenance.
- 3) The holding ponds need to be modified to create a better holding environment and to reduce fish stress and injuries during routine handling. Efforts should also be made to improve the water quality entering the holding ponds.
- 4) The hatchery alarm system should be modified to directly sense the holding pond water level and to register more than one alarm signal at any given time.

- 5) Both aeration towers need to be sandblasted and repainted.
- 6) The hatchery needs to have more gravel hauled in and spread on the driveways as well as an application of an oil dust abatement.
- 7) A cement slab (approximately 15-ft x 40-ft) is needed in front of the hatchery building for doing truck maintenance and other hatchery projects.
- 8) Construct a shop and remove shop items from the office and conference area.

STEELHEAD PRODUCTION

ADULT COLLECTION

Steelhead Returns to Hells Canyon Trap

The OFH trap, located at the base of Hells Canyon Dam, was put into operation on October 26, 1999 and was shut down for the season on December 8, 1999, having operated 17 days during that period. The trap was shut down due to icing conditions. It was put back into operation on March 21, 2000 and shut down April 4, 2000, having operated 7 days. The Idaho Fish and Game Department (Department) discontinued trapping because spawning quotas and out-planting needs were met. IPC personnel removed fish from the trap each day of operation and transported them to the OFH. Fish were processed upon arrival at the hatchery. Early in the season, all fish were held until quotas for the hatchery were met. At that time, some of the marked fish were used for out-planting. A total of 2,020 steelhead were trapped during the fall operation and another 230 steelhead were trapped during the spring operation. Of the 2,250 steelhead captured, there were 124 wild or natural fish. Wild or natural steelhead are identified by having an adipose fin and the remaining fins not eroded. All wild fish were returned to the Snake River below Hells Canyon Dam, usually on the same day they were trapped but not later than the following day. The 2000 brood year steelhead run of 2,250 fish consisted of 1,063 (47%) males and 1,187 (53%) females (Figure 1 and Appendices 1, 12, and 13).

Length Frequencies and Age and Sex Ratios

Fork lengths were taken on all trapped steelhead. One-ocean females are 64 cm and less, and one-ocean males are 67 cm and less. Two-ocean females are greater than 64 cm, and two-ocean males are greater than 67 cm. Age-class breakdown of the run was 1,930 one-ocean fish and 320 two-ocean fish. Age and sex ratios are as follows: one-ocean fish made up 86% of the run with a breakdown of 959 (50%) hatchery males; 36 wild males (2%); 867 (45%) hatchery females and 68 (3%) wild females. Two-ocean fish made up 14% of the run with a breakdown of 64 (20%) hatchery males, 4 (1%) wild male, 236 (74%) hatchery females and 16 (5%) wild females (Figure 2 and Appendices 2, 3, and 12).

Out-planting

During the fall of 1999 and the spring of 2000, 1,169 surplus steelhead were out-planted into surrounding waters for additional sport fisheries and supplemental propagation. During the fall of 1999, 300 were transported and released into the Boise River, 300 were released into Hells Canyon Reservoir, and 300 were transported and released into the Little Salmon River. In the spring of 2000, 204 were released into Hells Canyon Reservoir and 65 were released into Hazard Creek on the Little Salmon River (Appendices 4, 5, and 12).

Incidental Capture

Several rainbow trout were trapped and transported to OFH. They were released into Hells Canyon Reservoir. No other incidental capture occurred.

MARKS, FIN CLIPS, INJURIES

All trapped steelhead were checked for marks consisting of fin clips, tags and injuries. Marked fish consisted of 2,045 ad-clipped, 62 partially removed ad fins, and 19 full adipose fins but had coded wire tags or other fin damage to reveal its hatchery origin. There were 132 coded-wire tagged (CWT) fish, 0 radio tags, and 5 floy tags. The tagging agencies included the National Marine Fisheries Service (NMFS), the University of Idaho (UofI), Oregon Department of Fish and Wildlife (ODFW), and the Idaho Department of Fish and Game (Department). Snouts were removed from all CWT fish and sent to the lab in Lewiston. Injuries included 55 fish with gill net scars, 6 with nitrogen blisters, 141 with fresh body injuries, 246 with body scars, and 57 with opercle or gill injuries.

HOLDING AND SPAWNING

Pre-spawning Mortality

Pre-spawn mortality totaled 95 (4.46% of ponded fish) adult steelhead, comprised of 74 males and 21 females. Pre-spawn mortality numbers include all females that died prior to spawning and all males that died through the second week of spawning (March 29). All pre-spawned and spawned carcasses were frozen and picked up once a week by the local sanitation company and hauled to a Department of Environmental Quality (DEQ) approved landfill (Appendix 12).

Spawning Operations

Steelhead were initially sorted on March 1st and separated into two ponds by sex. Three-hundred-seventy-four females were spawned during 12 egg takes beginning March 16, 2000 and ending April 24, 2000. Females were sorted twice weekly for ripeness. Ripe females were killed with a blow to the head, dry-spawned by incision, and the eggs were collected in a colander to drain the

ovarian fluid. Eggs from each female were placed into a spawning bucket and fertilized with sperm from one or more males. One cup of chilled well water was added to the eggs and sperm mixture to promote sperm activity. The fertilized eggs from two females were poured together and allowed to stand in the egg, sperm, and water mixture for approximately five minutes. The fertilized eggs were then water-hardened in a 100-ppm buffered iodophore for approximately one half-hour. After the water-hardening process, the eggs were drained, rinsed, and poured into Heath trays in the incubation room. Ten females were killed and rejected during spawning due to abnormal appearance of eggs or internal organs. A total of 374 females were spawned; however the eggs from the first 71 females were culled. The remaining 303 females produced 1,523,428 green eggs for an average fecundity of 5,028. Percent eye-up was 87, leaving 1,319,069 eyed-eggs. Egg numbers were determined by enumeration with a Jentsort brand Model JH egg sorter with electronic counter (Appendices 5 and 6).

Disease Testing

The EFHL tested a representative sample of 150 (40%) females for viruses, 71 (19%) for Bacterial Kidney Disease (BKD) by enzyme linked immunosorbent assay ELISA and 20 (5%) for Whirling Disease (WHD). The eggs were loaded into the incubator trays with two families per tray to maintain the integrity of the disease samples. Test results showed that all females were negative for pathogens. These percentages are of total spawned females and include tests conducted on the steelhead that were spawned but eggs disposed.

INCUBATION

Egg Development

One or more males fertilized eggs from one female, then eggs from two females were pooled together. Eggs were water hardened in 100-ppm iodophore for at least one half- hour. Each pooled bucket was decanted and placed in an incubator tray. Incubation water was chilled to 40°F to 43°F for the majority of the rearing cycle and entered the stacks at approximately 5 gpm. The chilled water was to delay the rearing cycle development to achieve smolt target size without holding the fish off feed. After the first two days of incubation, the eggs were treated three times a week with a 15-minute drip treatment of 1,667-ppm Formalin to prevent fungus *Saprolegnia* growth. All the eggs incubated at OFH were shocked at 360 to 380 daily temperature units (DTU) and development of a strong eyespot. Shocking was accomplished by pouring the eggs from the Heath tray into a bucket containing 1-inch of water from a height of approximately 2 feet. The eggs were then poured back into the Heath incubator tray and allowed to sit overnight so damaged eggs would harden and turn white. Within 1-2 days after shocking, the eggs were floated in a salt bath and the majority of the dead eggs were removed with a screen. The remaining dead eggs were removed by hand. The eggs were counted using a Jentsort brand Model JH egg sorter with electronic counter.

Fry Development

After enumeration, eyed-eggs were placed back into the incubator trays to be reared to swim-up stage. Swim-up stage is normally achieved at approximately 950 DTUs. This year fry

DTU at shipping averaged 1003. The Formalin treatments were discontinued at 450 DTU.

EGG AND FRY DISPOSITION

Egg Shipments

Eyed-eggs were shipped from the end of May through the first week of June. Prior to shipping, the eggs were placed into 48-quart coolers and disinfected with 100-ppm Iodophore for 15 minutes. Upon completion of the disinfecting period, the eggs were drained and chilled water and ice were added. The coolers were transported in the hatchery Fish and Game truck. We shipped 528,253 eyed-eggs to NSFH (Appendix 7).

Fry Shipments

After reaching approximately 1,000 temperature units, 518,184 fry were shipped to NSFH. The fry were shipped in stainless steel tubes, each containing fry from 2-3 incubation trays. The tubes were loaded into a 1,000-gallon fish transport tanker filled with chilled well water. Approximately 200 lbs of ice was added to each tanker load to maintain a low water temperature (Appendix 7).

CARCASS DISPOSITION

All carcasses were checked for tags and hatchery employees checked females for signs of internal diseases. All carcasses were frozen, picked up weekly by the local sanitation company and hauled to a DEQ-approved landfill.

SMOLT RELEASES

Steelhead trout smolts were reared at NSFH. In the spring of 2001, IPC contracted smolt transportation from NSFH to below Hells Canyon Dam where 601,220 smolts (143,220 lbs) were released into the Snake River. Data for steelhead smolt numbers and lbs of smolts released can be found in the *Niagara Springs Fish Hatchery Brood Year Report* (Appendix 13).

SALMON PRODUCTION

ADULT COLLECTION

Salmon Returns to Hells Canyon Trap

Spring chinook salmon returning to the Hells Canyon trap in 1999 were from smolt releases in 1996, 1997, and 1998. The trap was operated for 27 days between May 5 and July 15, 2000. Due to high water flows, the trap was shut down from May 6 through May 17 and again from May 26 through June 2, and then was operated Monday through Thursday of each week until it was shut down for the season on July 15. Seventy-nine spring chinook were trapped during the operating period. They included 70 hatchery fish (89%) consisting of 66 jacks and 4 adults and 9 wild/natural fish (11%) consisting of 6 jacks and 3 adults. The wild/natural fish were caudal fin-punched and released below Hells Canyon Dam. In the event they returned to the trap three times, they would be treated as a hatchery fish. None of the wild/natural fish returned to the trap (Figure 3 and Appendices 8, 12, and 13).

Length Frequencies and Age and Sex Ratios

Length frequencies were taken on all fish trapped. The age-class breakdown by fork length was as follows: 1-ocean (3 yr olds ≤ 56 cm.), 2-ocean (4 yr olds 57-80 cm.), and 3-ocean (5 yr olds ≥ 81 cm.). One-ocean fish accounted for 72 (91%) of the salmon trapped and consisted of 66 (92%) hatchery fish and 6 (8%) wild fish. Two-ocean fish accounted for 2 (3%) of the salmon trapped and consisted of 1 (1.5%) hatchery fish and 1 (1.5%) wild fish. Three-ocean fish accounted for 5 (6%) of the salmon trapped and consisted of 3 (60%) hatchery fish and 2 (40%) wild fish. Due to the lack of distinguishing characteristics at the time of trapping, the sex ratio was not determined (Figure 4 and Appendices 9, 10, and 12).

HOLDING AND SPAWNING

Transport

Idaho Power personnel transported salmon from the trap to the hatchery daily where they were processed upon arrival. Wild/natural salmon were returned and released below Hells Canyon Dam the same day as trapped or on the following morning. Adult hatchery fish were loaded into the portable transport tank in the back of a pickup truck and transferred to RRFH at least weekly. The hauling water was chilled with incubation well water and chlorine-free ice added to maintain a temperature of 56°F. A small bag of Clinoptilolite was placed in the tank to absorb ammonia secreted by the fish during transport. The fish were checked for signs of stress and water temperatures were taken in Cambridge and New Meadows. If the temperature was rising, more ice was added to the tank. Jacks were held in the south pond until 20 or more had been interrogated, at which time the Nez Perce were contacted and picked up the jacks on two different days. In July, the water temperature was too high to hold the jacks long enough to collect twenty or more so they were transported to RRFH weekly (Appendix 11).

Holding

Upon arrival at the hatchery the salmon were measured, checked for PIT tags, coded wire tags, floy tags; and marks, including fin clips and injuries. All information was recorded for future use. The adult salmon were injected with Erythromycin, right operculum-punched, and placed in the northeast holding pond. Jacks were treated in the same manner except they were not injected or punched and were placed in the southeast pond. Wild/natural fish were measured, checked for marks and injuries and checked for tags to ensure wild status. Wild/natural fish were released into Snake River below Hells Canyon Dam. Holding pond water temperatures ranged from 59°F to 73°F during the trapping season.

Adult Treatments

All marked adult hatchery fish were given an IP injection of Gallimycin (Erythromycin 200 mg/ml) prior to transfer to RRFH. All of them were injected at the rate of 20 mg/kg of body weight as determined using a length to weight ratio. Wild/natural fish were not injected.

Pre-spawning Mortality

There were no trap mortalities, but there were two holding pond mortalities. Both were jacks. One jumped over the fence on the east adult pond the night before transport and the second mortality happened in the spawning house just before the Nez Perce Tribe was scheduled to transport the jacks off station. A gap was discovered in the plastic netting over the water flume that supplies water to the upper holding tank and the jack jumped out and was found dead on the grating. Two jacks also escaped through the gap in the plastic netting over the water flume and were presumed to have ended up in Hells Canyon Reservoir. The gap was immediately repaired and no additional fish were lost.

Spawning Operations

The salmon were transported to RRFH for spawning. Oxbow personnel assisted with spawning operations. Additional information can be found in the *Rapid River Fish Hatchery 1999 Run Report*.

FIGURES

Figure 1. Steelhead Run Timing

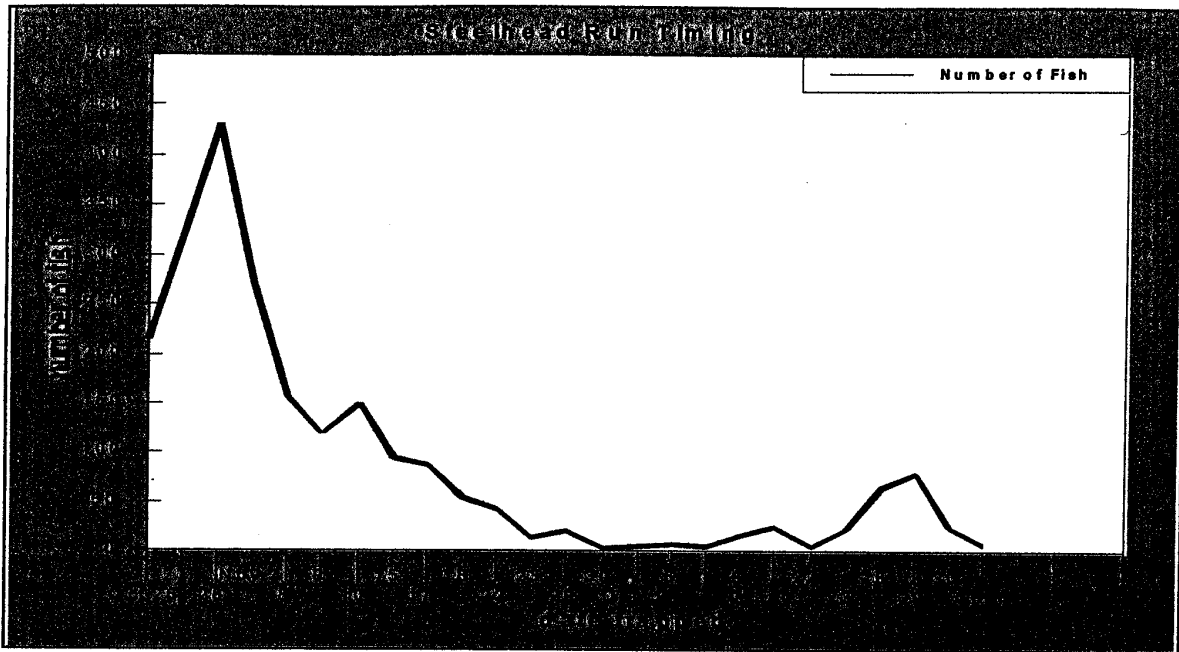


Figure 2. Steelhead Length Frequencies

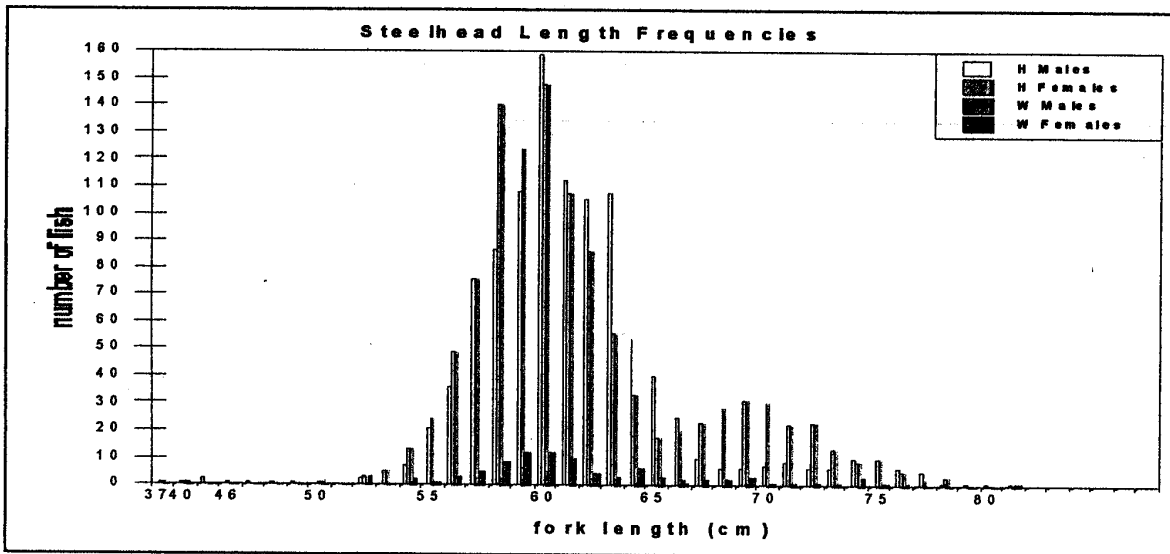


Figure 3. Spring Chinook Run Timing

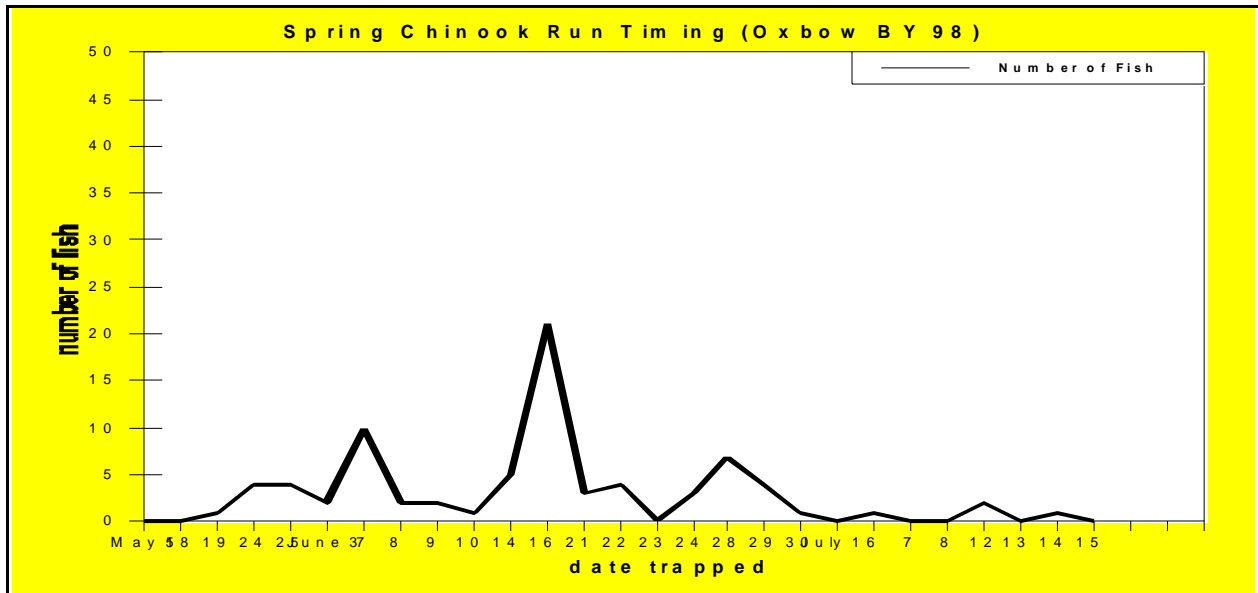
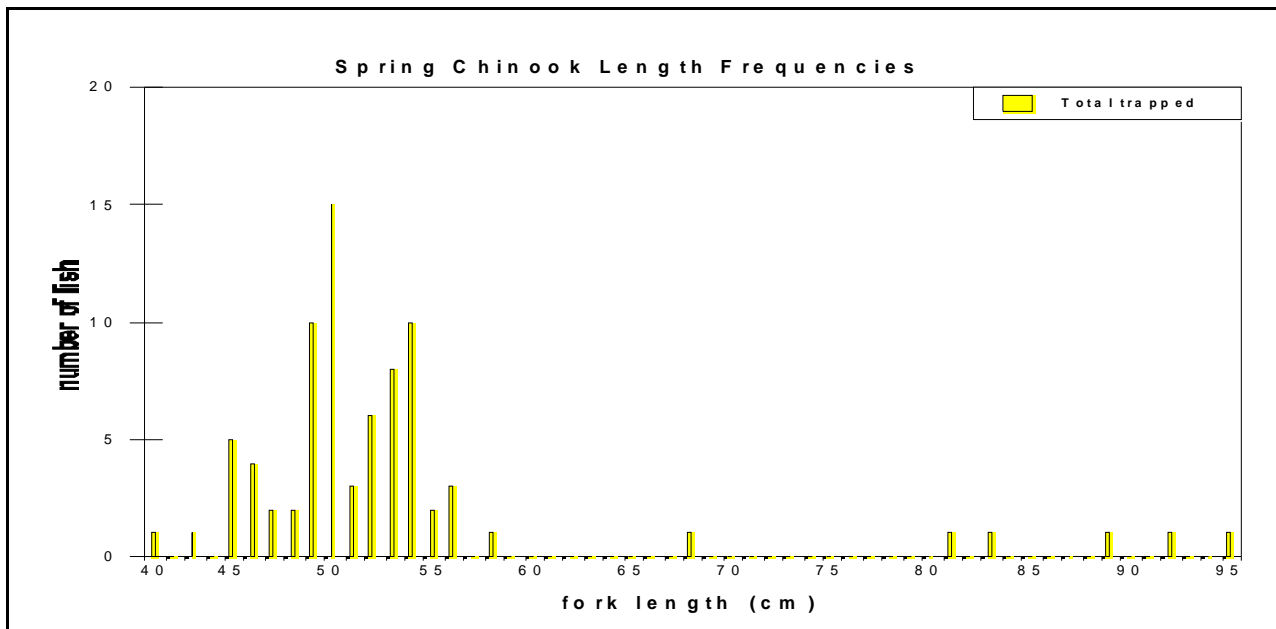


Figure 4. Spring Chinook Length Frequencies



APPENDICES

Appendix 1. Steelhead Run Timing

Month / Date Trapped	Number of Fish	Month / Date Trapped	Number of Fish
OCTOBER 26	215	MARCH 21	26
27	321	22	05
28	432	23	22
NOVEMBER 04	273	28	65
08	156	29	79
09	119	30	25
10	150	APRIL 04	08
15	95		
17	88		
18	54		
22	43		
23	15		
29	21		
30	03		
DECEMBER 01	05		
06	08		
07	06		
08	16		
TOTAL	2,020	TOTAL	230

Appendix 2. Steelhead Length Frequencies

Cm	Totals	H Males	H Females	W Males	W Females
37	1		1		
40	3	1	1	1	
41	2	2			
46	1	1			
47	1	1			
49	1	1			
50	2		1	1	
52	8	2	3		
53	9	4	5		3
54	23	7	13	1	2
55	47	21	24	1	1
56	90	36	49	3	2
57	159	76	76	2	5
58	237	87	140	2	8
59	250	108	124	6	12
60	324	159	148	5	12
61	231	112	107	2	10
62	197	105	86	2	4
63	168	107	56	2	3
64	94	54	33	1	6
65	60	40	17	3	
66	48	25	20	2	1
67	37	10	23	2	2
68	36	6	28		2
69	41	6	31	1	3
70	38	7	30		1
71	31	8	22	1	
72	31	6	23	1	1
73	20	6	13	1	
74	21	10	8		3
75	11		10		1
76	12	6	5		1
77	7	5	2		
78	4	1	3		
79	1	1			
80	1	1			
81	3	1	1		1
Total	2,250	1,023	1,103	40	84
AGE class	MALE	FEMALE	TOTAL	AVG LENGTH	
ONE-ocean	995	935	1,930	59.86 cm	
TWO-ocean	68	252	320	70.44 cm	
TOTAL	1,063	1,187	2,250	61.36 cm	

Age Class Breakdown:

One-Ocean (males < 68 cm, females < 65 cm)

Two Ocean (males ≥ 68 cm, females ≥ 65 cm)

Appendix 3. Steelhead Age and Sex Ratios

	Hatchery males	Wild/natural males	Hatchery females	Wild/natural females	Total
1-Ocean	959	36	867	68	1,930
2-Ocean	64	4	236	16	320
Total	1,023	40	1,103	84	2,250

Appendix 4. Steelhead Disposition

2,250	Trapped (2,020-fall, 230-spring; Wild and Hatchery)
1,169	Released (Out-planted)
2,126	Ponded (Hatchery)
124	Wild/natural released

Appendix 5. Steelhead Male to Female Disposition

MALES		FEMALES	
342	Spawned	*374	Spawned/killed
10	Killed and rejected	4	Killed and rejected
107	Mortalities	120	Mortalities
40	Wild released	84	Wild released
564	Out-planted	605	Out-planted
1,063	Total males	1,187	Total females

*Eggs from 71 females from the early spawns were culled to make room for eggs from later run steelhead, leaving a total 303 spawned with eggs retained.

Appendix 6. Steelhead Spawning Summary

Lot #	Spawn Date	Number Females	Green Eggs	Eyed Eggs	Percent Eye-up	Eggs/ Female
A						
B	3/20/99	38	181,318	159,567	88	4,772
C	3/24/99	46	241,280	206,415	86	5,245
D	3/27/99	43	225,190	193,539	87	5,237
E	3/30/99	18	92,701	84,694	92	5,150
F	4/03/99	14	78,292	61,200	78	5,592
G	4/06/99	17	86,650	76,094	88	5,097
H	4/10/99	26	138,642	127,883	92	5,332
I	4/13/99	19	91,170	80,976	89	4,798
J	4/17/99	36	165,413	139,020	83	4,595
K	4/20/99	28	142,947	122,156	85	5,105
L	4/24/99	18	79,825	67,525	84	4,435

Lot A culled in its entirety prior to counting.

Appendix 7. Steelhead Disposition of Eggs and Fry

1,523,428	Green eggs
198,634	Initial pick off
5,725	Secondary pick off
1,319,069	Eyed eggs (87%)
528,253	Eyed eggs shipped to Niagara Springs
790,816	Eyed eggs remaining on station
23,724	Eyed eggs to fry loss @ 3%
518,184	Fry shipped to Niagara Springs
248,908	Excess fry

Appendix 8. Spring Chinook Run Timing

DATE	TOTAL TRAPPED	TRAPPED HATCHERY	TRAPPED WILD	RELEASED WILD	MORTALITY ESCAPES	HAULED
5/05/99	0					
5/18/99	0					
5/19/99	1		1	1		
5/24/99	4	4				
5/25/99	4	4				
6/03/99	2	1	1	1		
6/07/99	10	9	1	1		
6/08/99	2	2				
6/09/99	2	2				
6/10/99	1	1				
6/11/99						NP – 23
6/14/99	5	5				
6/16/99	21	20	1	1		
6/18/99					M – 1	RR – 2
6/21/99	3	3				
6/22/99	4	3	1	1	M - 1 ES - 2	NP – 21
6/23/99	0					RR – 1
6/24/99	3	1	2	2		
6/28/99	8	7	1	1		
6/29/99	4	4				
6/30/99	1	1				
7/01/99	0					
7/02/99						RR – 2
7/06/99	1	1				
7/07/99	0					
7/08/99	0					RR – 11
7/12/99	2	1	1	1		
7/13/99	0					
7/14/99	1	1				
7/15/99	0					
7/19/99						RR – 6
Totals	79	70	9	9	4	66

ES – Escapes
M – Mortality's
RR – Rapid River
NP – Nez Perce

Appendix 9. Spring Chinook Length Frequencies

FORK LENGTH (cm)	HATCHERY JACKS	HATCHERY ADULTS	WILD JACKS	WILD ADULTS	TOTAL FISH TRAPPED
40	1				1
43	1				1
45	5				5
46	4				4
47	2				2
48	2				2
49	10				10
50	11		4		11
51	2		1		2
52	6				6
53	8				8
54	10				10
55	2				2
56	2		1		3
58		1			1
68				1	1
81		1			1
83				1	1
89		1			1
92				1	1
95		1			1
Total Fish	66	4	6	3	79

Appendix 10. Spring Chinook Age Class Breakdown

	Hatchery	Wild/Natural	Total
1-Ocean	66	6	72
2-Ocean	1	1	2
3-Ocean	3	2	5
Total	70	9	79

1-Ocean (3-yr-olds, ≤ 53 cm)

2-Ocean (4-yr-olds, 54-80 cm)

3-Ocean (5-yr-olds, ≥ 81 cm)

Appendix 11. Spring Chinook Disposition

	Hatchery	Wild / Natural
Trapped – Oxbow	70	9
Escaped – Oxbow	2	0
Mortalities – Oxbow	2	0
Released – Oxbow	0	9
Transferred to RRFH	22	0
Transferred to tribe	44	0

Appendix 12. Oxbow Hatchery Fish Trapping Summary and Breakdown

STEELHEAD BROOD YEAR 2000

<u>Fish Trapped</u>		<u>Age Class Breakdown *</u>	
Males	1,063	1 Ocean	1,930
Females	1,187	2 Ocean	320
Total	2,250	Total	2,250

<u>Fish Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Pre-spawn Mortality	74	21	95
Trap & Pond Morts	33	99	132
Spawned only *	342	374	716
Released	40	84	124
Out Planted	564	605	1,169
Killed but not used	<u>10</u>	<u>4</u>	<u>13</u>
Total	1,063	1,187	2,250

*1 to 1 spawning ratio, all males were spawned at least once.

<u>Carcass Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Hauled	459	498	957

*Age Class Breakdown: 1 Ocean: males <68 cm (721), females <65 cm (652)
2 Ocean: males ≥68 cm (164), females ≥65 cm (505)

SPRING CHINOOK SALMON BROOD YEAR 1998

	<u>Fish Trapped</u>				<u>Age Class Breakdown **</u>		
	Total	Hat	Wild		Total	Hat	Wild
Jacks	72	66	6	1-Ocean	72	66	6
Males	3	2	1	2-Ocean	2	1	1
Females	4	2	2	3-Ocean	5	3	2
Total	79	70	9	Total	79	70	9

Due to the lack of distinguishing characteristics the sex was not determined, therefore the male and female numbers are not available.

<u>Fish Disposition</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Trap & Pond Mortality	3	1	4
Pre-spawn Mortality	0	0	0
Shipped to Rapid River *	21	1	22
Transferred to Nez Perce Tribe *	44	0	44
Adults Released	1	2	3
Jacks Released	6	0	6

* Jacks

Age Class Breakdown:
1 Ocean (3-yr-olds, ≤53cm)
2 Ocean (4-yr-olds, 54-80cm)
3 Ocean (5-yr-olds, ≥81cm)

Appendix 13. Snake River Historic Releases and Return Data

Year	Chinook Released	Steelhead Spring	Released Fall	Chinook Returns	Steelhead Returns
1966			29,400		
1967		587,513			1,681
1968		342,114			1,609
1969		109,200	757,500	344	1,122
1970		385,900	670,960		136
1971			215,625		279
1972			630,900	3	650
1973				2	435
1974				1	125
1975			40,977	14	34
1976			85,510		224
1977		126,000	301,644		243
1978			344,944		186
1979			548,987	1	36
1980		348,520	191,900		339
1981	1,003,200	614,160			158
1982		354,150			203
1983	250,020	92,750	220,270	16	872
1984	500,850	458,917	630,500	3	1,116
1985	437,360	414,712	387,353	699	1,343
1986	140,000	819,495	39,995	395	2,438
1987	547,700	800,000	672,235	543	3,209
1988	400,600	877,400	75,814	458	2,524
1989	500,000	735,500	603,000	84	2,729
1990	551,200	947,200	351,400	30	2,728
1991	500,500	912,000		22	1,151
1992	500,500	243,900		912	1,714
1993	200,300	660,500		431	1,259
1994	380,504	609,115		29	1,403
1995	499,986	614,560		36	1,597
1996	67,818	630,152		78	1,383
1997	13,470	660,651		944	1,270
1998	304,096	653,276		74	2,407
1999	300,000	657,665		79	2,042
2000	0	601,220		1,174	2,250

Submitted by:

Approved by:

**Kent Hills
Fish Hatchery Assistant Manager**

**Virgil K. Moore, Chief
Fisheries Bureau**

**Tom Rogers
Anadromous Fish Hatcheries Supervisor**